VIRGINIA CLASS SONAR/Combat Control/Architecture

IETMs for the Future

April 2002

Mindy Rash
S/CC/A IETM Manager
NUWC On-Site Rep

VIRGINIA Class S/CC/A IETMs

- Purpose

  To present the VIRGINIA Class S/CC/A IETM development and maintenance approach using a relational database design

VIRGINIA Class S/CC/A IETMs

- SONAR – AN/BQQ-10(V)4
- Combat Control (CC) – AN/BYG-1(V)1
- Architecture – AN/BYK-6
- System Level Technology Manual (SLTM)

Program Office
PMS401/425

- PMS401 contracted Lockheed Martin (LM) as Prime System Integrator
- LM subcontracted Raytheon for VA CC IETM
- VA SONAR & CC programs in transition to PMS425
- Architecture program stays in PMS401
- ILS Manager, Jim Ensminger (SEA 92LAA5), retains responsibility for all 4 programs

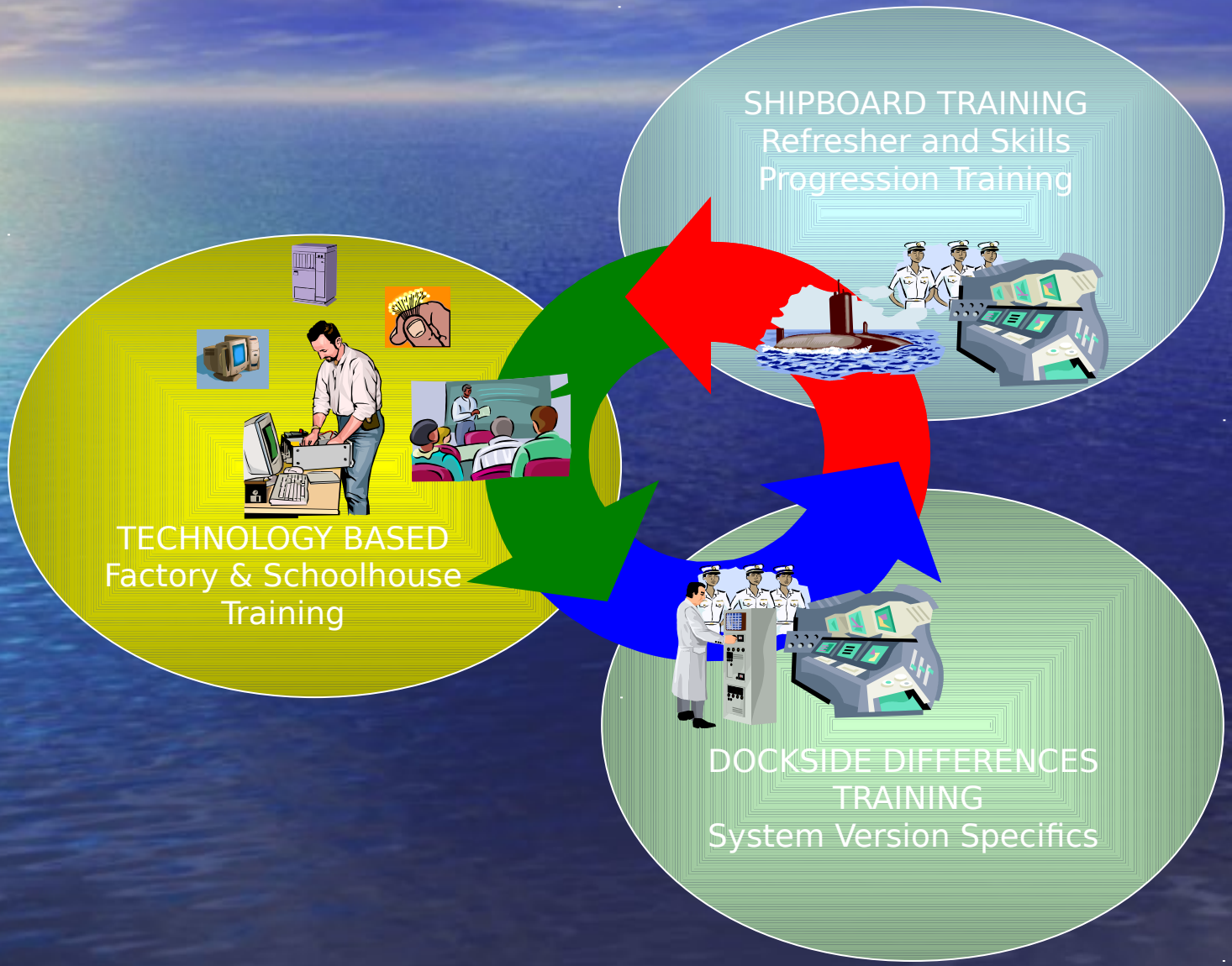
VIRGINIA Class S/CC/A IETMs

- Supporting Coordinated Off-hull Assembly & Test Site (COATS) activities
- FY02 Factory Training supported with Preliminary IETMs
- SONAR IETM for Factory Training was a hybrid (A-RCI/VA SONAR) – to be updated for dockside system upgrade FY03
  - IDP Shared resources, common data and processes enabled significant cost savings
- All 4 IETMs support Train to Technology (T2T)

VIRGINIA Class S/CC/A IETMs

- VA Class Fire Control and SONAR techs are cross-trained to maintain all 3 S/CC/A subsystems
- T2T is the revised maintenance training approach for VA S/CC/A
  - T2T first teaches a common core set of technologies and functional theory and then teaches a baselined COTS-based electronics system.
  - Developed “new” SLTM to support T2T
    - SLTM introduces subsystems
    - SLTM introduces and supports instruction of common core technologies

VIRGINIA Class S/CC/A Training T2T Approach



S/CC/A IETM Goals & Requirements

Fleet

- Accuracy
- Current technical data
- Accessibility
- All inclusive (1-2 CDs/network access vice multiple paper TMs)
- Portability (anywhere onboard)
- User-friendly

Program

- Transportable
- Use of non-proprietary, commercially available tools
- Capable of being hosted on tactical system, ATIS and NTDPS
- Capable of addressing multiple configurations
- Capable of supporting rapid/frequent changes
- Cost effective, repeatable processes

IETM Primer
About IETM Types

Consider	Electronically Indexed Page Images (1)	Electronically Scrolling Documents (2)	Linear Structured IETMs (3)	Hierarchially Structured IETMs (4)	Integrated Database IETMs (5)
User's Display	Page image	Scrolling page image	Screens with some scrolling	Screens of information	Screens of information
Printing	Page printing	Document printing	Section printing	Screen or topic printing	Screen or topic printing
Navigation – Functionality	Page views – no links	Scrolling browse – limited links	Logical display of information & link interaction	Logical display of information & link interaction	Logical display of information & link interaction
Data Storage and Format	Raster images of pages	Text – ASCII	Linear ASCII with tags	Attributed database elements	Attributed database elements
Change Management	Regenerate from original source	Regenerate from original source	Regenerate from flat-file tagged document source	Deploy – generate from IETM database	Deploy – generate from IETM database
Tool Support	Imaging system Applications	Publishing application with format	Publishing application with content	Database I/F tool supporting IETM	Database I/F tool supporting IETM

IETM Acquisition
Seeking a Solution

- Step 1: Defined what was to be documented and what operational features were needed.
- Step 2: Determined availability of source data – re-used as much as possible.
- Step 3: Weighed the usefulness and cost effectiveness of the information.
- Step 4: Determined the appropriate IETM level or combination of levels.

IETM Acquisition Concept of Operations

What to know about your program	1	2	3	4	5
New programs – Eligible for higher class IETM, comparable data development cost with greater reuse of data, ease of deployment	X	X	✓	✓	?
Configuration volatility – Analyze the potential for rapid evolution or multiple baselines. If high volume of change is expected, database solution can be used to distinguish between configurations.	X	X	X	✓	?
Consolidation of subject matter – Maximize use of common data to reduce life-cycle cost and increase efficiency, quality, accuracy, and timeliness of data. If potential of data reuse exists, high-end SGML or database solution will be required.	X	X	✓	✓	?
Complexity of system – If expert system is required, a database solution ***must*** establish the documentation foundation.	X	X	X	✓	✓
Number of users/deployed systems – Consider the magnitude of users in the field to determine licensing issues and ease of IETM deployment.	X	X	X	✓	?
Training level – Evaluate Training strategy with content of IETM. Considering all logistics functions, Training is best served	X	X	✓	✓	✓

IETM Solution
Tool Requirements

- Hierarchial database system supports data management and information reuse goals
- Open system architecture based on COTS tools
- Ability to maintain multiple system configurations
- Management of large volumes of data
- Run-time licensing cost considerations
- Training development and deployment tool interfaces

IETM Solution Considered Existing Tools

- Not selected - “did not meet requirements”
  - Unisys: Interactive Authoring and Display System (IADS)
    - Not hierarchial database
  - LM: Integrated Maintenance Information System (IMIS)
    - UNIX investment for authoring
    - Limited deployment options
    - Operating system learning concerns for authors
  - McDonnell Douglas: Quill
    - UNIX investment for authoring
    - Learning concerns for authors
    - Developed as a legacy manual conversion tool
    - No fielded implementations

IETM Solution

Finalist - Hughes: Advanced Integrated Maintenance Support System (AIMSS)

Advantages

- Company supported COTS product, training/technical support available
- Significant user base (US Navy)
- Basic compliance with development spec
- Free run for deployment
- Uses IETM database
- Ability to export SGML

Disadvantages/concerns

- Cost - $15K/station
- Only supports single user, not multiple authors
- Uses proprietary IETM database
- Limited commercial exposure
- Not proven on large system implementation
- Data management issues

AIMSS 3.2.2 not selected

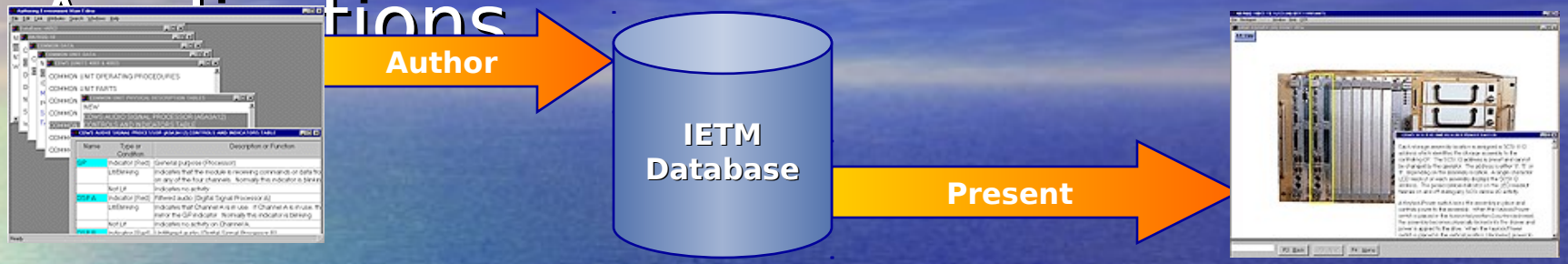
IETM Solution
Make or Buy

- Expanded tool search to the commercial market
- Identified Sybase Powerbuilder product as foundation for IETM development tool set
  - Advantages
    - Uses multiple COTS relational database products
    - Non-proprietary relational database support enhances data supportability and transportability
    - Large commercial developer, user and support base
    - Applications developed using Powerbuilder have no Sybase licensing restrictions
    - Open system/open architecture product development environment
    - Supports complex multiple application development
    - Navy retains the rights to use the applications to maintain the IETMs

IETM Solution HIGHtide™ is Created

- Cost benefit analysis determined that a development tool set:
  - Best met program goals and product requirements
  - Offset disadvantages of existing IETM development tools
  - Proved to be the most cost-effective, given start-up and life-cycle costs
- HIGHtide™ supports authoring, database maintenance and presentation

IETM Solution
Design Database and
Applications



Authoring Application:
- ✓ IETM Database content manager
- ✓ Authors organize and manage IETM Database data
- ✓ Links related IETM content
- ✓ Content imported from standard editing applications
- ✓ Links to external programs

IETM Database:
- ✓ Provides storage for IETM content
- ✓ Hierarchically structured
- ✓ Generic Level Data Model compliant (Spec-87269)
- ✓ Content tags inherent to database, data void of document format tags
- ✓ Stores multiple system variants within a common data source (enhanced reuse)
- ✓ Open System - non-proprietary data structure
- ✓ Security permissions control Author / User Access

Presentation Application:
- ✓ Windows Application providing user interface to IETM database
- ✓ Interactive navigation based on user input
- ✓ Compliant with customer's IETM Presentation specification

IETM Solution
Data Transportability

- Issue: IETM content that is not transportable is considered proprietary
- Concern with ability to competitively transition or reuse information
  - Lower level IETM solutions ensure transportability with use SGML and DTD
  - For relational database approach, SGML “flat file” has no effect on storage or operation
- Solution: Data transportability demonstrated
  - Open database design (multiple databases)
  - XML export (extract application)

IETM Solution
Data Interoperability

- Goal: Support interoperability within a broad user group
- Solution:
  - Adopted commercially proven deployment strategies
    - Via Internet architecture and World-Wide-Web
  - Developed extract application to support HTML and XML image
    - No maintenance of HTML; content update via database
    - HTML extract generates relative addressed web and requires no clean up
    - XML extract with DTD and style sheets

VIRGINIA Class S/CC/A IETMs

- Key points
  - Highly interactive, graphics-oriented
  - Viewable in Windows (pres) or web environment (HTML)
  - Compatible with standard commercial web browsers (Netscape & Internet Explorer)
    - No unique plug-ins are required
    - Not reliant on style sheets
  - Consistent organization and management of data across IDP IETMs

VIRGINIA Class S/CC/A IETMs

- Key points
  - Supports extensive data reuse and version control
  - Ability to import data from standard commercial editing and graphic packages
  - Ability to create hyperlinks within the document or link to external programs and files (i.e., AN/UYQ-70 IETMs)
  - Interfaces Training development and deployment tools (Authored Instructional Material (AIM) & Interactive Multimedia Instruction)

IETM Solution Improvements

- Ongoing tool-set modifications enhance usability and productiveness:
  - Node status flags - reflect element review status
  - “New” node indicator - alerts user to change
    - Node comment field - developer comment tracking
  - Graphics format - conversion from .bmp to .jpg & .gif
  - Search capability - supports author and user (web)
- Style and Conventions Guide - ensure consistency across IETM development

S/CC/A IETM Challenges

- Maintain leading edge – take advantage of technological advances in IETM s/w and h/w
- Keep pace with engineering to support frequent updates inherent in COTS-based systems
- Determine and apply “right” level of integration and granularity in linking
- Ongoing process/product improvement
- Use of version descriptions and “new” and “modified” tables linked within IETM to reflect changes

S/CC/A IETM Challenges

- Move forward smartly with Commonality initiatives
- “Grow” the SLTM to support a fully implemented Train to Technology program
- Gain acceptance for a unique, but effective implementation of IETMs built using a relational database approach